"UNVEILING LIFE'S TAPESTRY: DISCOVERING OUR LIFELONG CONNECTIONS AND PURSUITS"

Universidad de Navarra

Probability and Statistics Project

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Submitted on : October 26, 2023

PROJECT DESCRIPTION

The concept of time is a fundamental aspect of human existence, shaping our daily routines, relationships, and overall quality of life. As part of our university project, we have embarked on a comprehensive study to understand how individuals allocate their time across various activities, and with whom throughout their entire lifespan. By analyzing this data, we aim to gain insights into the patterns and trends that emerge, shedding light on the impact of culture, age, and societal changes on our time allocation.

Index

Sources

- https://ourworldindata.org - Our main data source
- https://www.bls.gov/news.release/pdf/atus.pdf - American Time Survey, directlly

Other resources for specific graphs:

- https://www.madisontrust.com - directly related to ourworldindata.org

Goals, What were we looking for ?

1. How people in different countries spend their time doing things:

We aim to analyze and compare the time allocation of individuals from various countries. We will collect data on various activities such as work, leisure, household chores, socializing, etc., and examine how people from different countries prioritize and distribute their time. This analysis will provide insights into cultural differences, lifestyle patterns, and societal norms across different regions.

2. Does different cultures affect our time use:

Understanding the influence of culture on individuals' time use. By examining data from diverse cultural backgrounds, we can identify how cultural factors such as values, traditions, and social norms impact how people allocate their time. This analysis will help us understand if cultural differences play a significant role in shaping individuals' time management strategies and activity choices.

3. With whom we spend our time depending on our age, how much time we spend lonely:

We aim to explore the relationship between age and social interactions. By analyzing data on individuals' age groups and their reported social interactions, we can determine how socialization patterns change across different age brackets. Additionally, we can investigate the prevalence of loneliness and its correlation with age, providing insights into the potential impact of social isolation on different age groups.

4. What is expected to happen in the future, how much time we will spend with others?

We aim to make predictions about future time use patterns and social interactions. By utilizing historical data and employing predictive modeling techniques, we can forecast how individuals' time allocation and socialization habits may evolve over time. This analysis can help anticipate potential shifts in societal dynamics and inform decision-making in areas such as resource allocation, social policies, and urban planning.

How we found our answers

1. Analyze what we do with our time:

By examining how we allocate our time, we can identify patterns, prioritize tasks, and make necessary adjustments to optimize our daily routines. This analysis can involve tracking activities, categorizing them, and assessing the time spent on each. It helps us identify time-wasting activities, areas where we can delegate or automate tasks, and opportunities for personal growth or skill development.

2. With whom we spend this time:

The people we choose to spend our time with greatly influence our happiness and success. Surrounding ourselves with positive, supportive individuals who share our values and aspirations can inspire us to reach new heights. By evaluating our social circle, we can ensure that we are investing our time in nurturing relationships that bring joy, encouragement, and personal growth.

3. Search for relationships in our data:

Searching for relationships in our time data can uncover valuable insights about our habits and behaviors. By analyzing how certain activities or individuals impact our mood, productivity, and overall well-being, we can make informed decisions about how to structure our time. This data-driven approach enables us to identify positive relationships that contribute to our success and happiness, while also highlighting any negative influences that may be holding us back.

Introduction

How people spend their time is something that tends to be unique to everyone, or so that is what we think. The reality is that not a single person spends their time the same way as anyone else yet there are large patterns and trends that can be seen not only across different regions of the world but also across cultures. Depending on the region or country one lives in drastically affects one's day to day life more than we think. Did you know that on average adults in Spain work only 2.9 hours a day while one in Japan works almost double that at 5.4 hours a day? Such a drastic change like this can be explained just by looking at the country one lives in. But why are there such changes? Why do those in the United States spend the least amount of time eating per day? Why are people feeling so lonely these days? All these questions have much more complex answers and their trends are explained by more than just one reason.
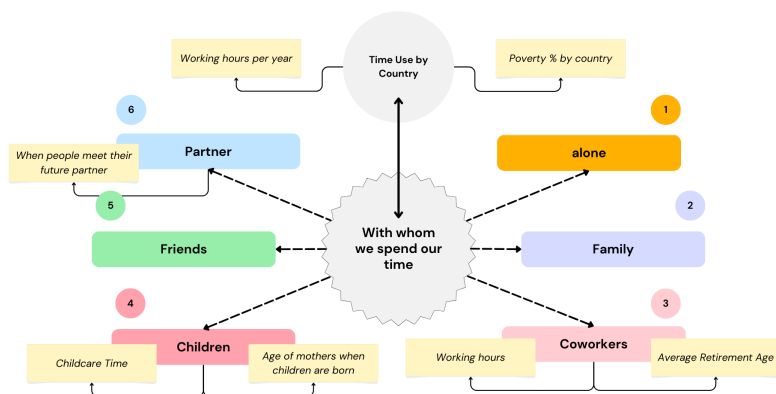
*Data and relations map. Connections between information provided.*

Global Level

Along the globe we have hundreds of different countries and within those countries hundreds to even thousands of different cities all with their different customs. Depending on the geography of where one lives there are many factors that change how one spends their day. Changes in time spent can be a result of not just the culture but also climate, living conditions/standards and so much more. These living conditions and climate affect daily life tremendously. Along with traditions which impact eating habits, leisure and working hours. Attached below is a histogram depicting the average time use by country for those aged between 15 to 64 years old.

Time Use by Country (aged 15 to 64)
Source:https://ourworldindata.org/time-use
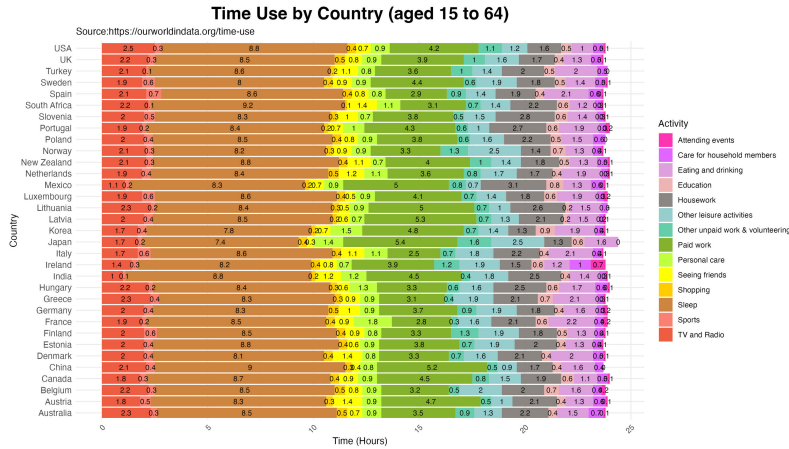
**Due to rounding of each variable, sums of the countries are not all equivalent to 24 hours

As depicted in the graph above, the average time use tends to be similar amongst the countries following a general trend of eight hours of sleep. This follows the global health guideline that one should get between seven to nine hours of sleep per night. The majority of the countries are above this average of eight hours yet there are a few that seem to be just under the average yet by not too much so there isn't much concern. Another interesting part of this graph is the Eating and drinking column. Going back to the cultures idea we noted that the United States is the number one country in the world for fast food restaurants. The typical way of life for an American is rushing from one place to another while the emphasis on meal time is minimal. Americans love getting that "quick bite" which creates this idea that meal times are not too important. This is why they spend only one hour per day eating. On the opposite end of the spectrum, European countries spend about twice as much time as Americans eating and drinking. Europeans seem to cherish their time spent eating and drinking, whether it is a beer after work or a nice meal with a glass of wine. They spend this time to relax and unwind after a long day, talking with friends or family but not about work. In contrast with American society the conversations held at table have nothing to do with work.

Distribution of Time Spent per Day by Activity
Source: https://ourworldindata.org/time-use
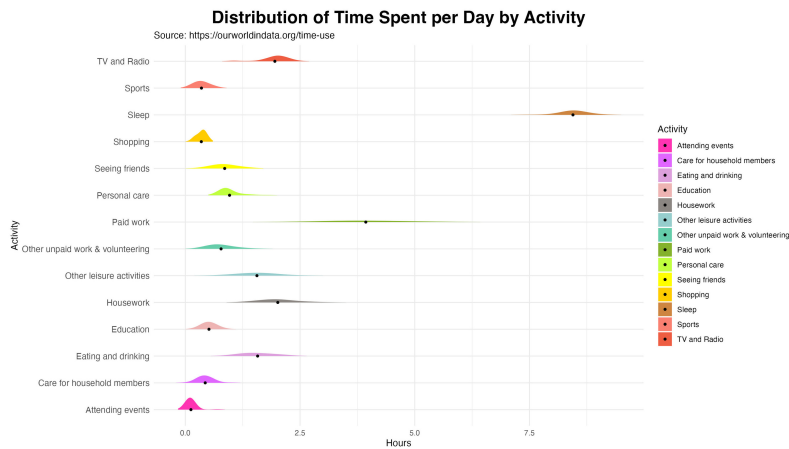
**The dot black dot represents the mean of each variable

In the flat violin graph above, one can see that there is a general trend of a normal distribution on most graphs with a few outliers. In general as the activity takes up less time, there is a more dense plotting with the exception of paid work. Paid work seems to have the largest amount of discrepancy. The density seems to be almost uniform yet it is still relatively normal. Described in the table below, there is an enormous variance at 0.59 when compared to the rest of the activities whose variance tends to be around 0.1 or even less. In practice a variance

of less than one is representative of low variation. Because we have such low variance in the other activity columns and due to our density graph it is obvious that the variation in paid work is not necessarily consistent with the rest of the data. There also exist discrepancies in distribution of other leisure activities, housework and as mentioned before in eating and drinking. These categories with the exception of eating and drinking don't have a logical explanation for their variation. The correlation between these activities and other factors have not been found. All of the variables in the table below and graphs above are classified as quantitative variables due to their classification being solely numerical values.

Activity	Mean	Max	Min	Median	Std	Var
Sleep	8.45	9.2	7.4	8.5	0.34	0.11
Paid work	3.93	5.4	2.5	3.8	0.77	0.59
Housework	2.02	3.1	1.3	2	0.42	0.18
TV and Radio	1.95	2.5	1	2	0.32	0.1
Eating and drinking	1.58	2.2	1	1.5	0.33	0.11
Other leisure activities	1.56	2.5	0.7	1.6	0.41	0.17
Personal care	0.96	1.8	0.7	0.9	0.24	0.06
Seeing friends	0.86	1.4	0.3	0.8	0.28	0.08
Other unpaid work & volunteering	0.78	1.6	0.3	0.7	0.29	0.08
Education	0.52	0.9	0.2	0.5	0.15	0.02
Care for household members	0.43	1	0	0.4	0.17	0.03
Shopping	0.35	0.5	0.1	0.4	0.11	0.01
Sports	0.35	0.7	0.1	0.3	0.16	0.02
Attending events	0.12	0.7	0	0.1	0.12	0.01

Working Hours per Year by Country

Average Annual Working Hours per Year by Country
Source:https://ourworldindata.org/time-use
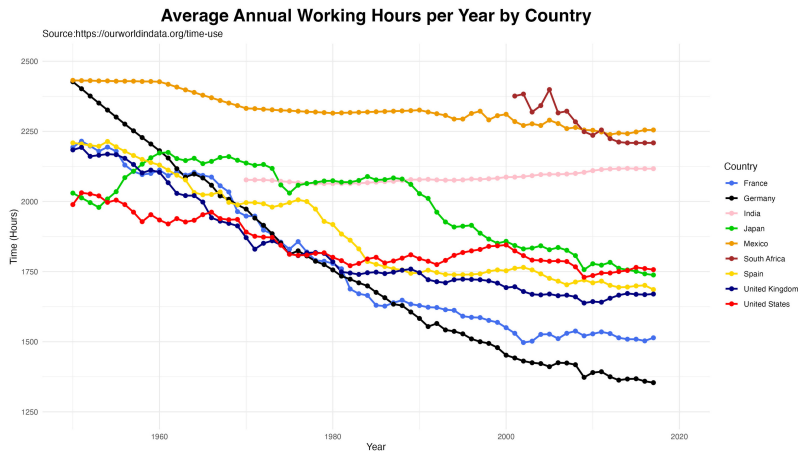
**Note that South Africa did not have accurate data prior to 2001 causing for missing data points.

The average working hours by country is a graph that has been declining immensely due to recent changes in working conditions and customs. All of the countries have had a decline in number of hours worked annually since the 1950s with Germany having the steepest decline. The majority of the countries selected in our graph have had a similar decline with the exception of Mexico. Mexico seems to have not adopted such a decrease in the last ~70 years. Mexico out of the countries listed above does have some of the weakest labour laws which unfortunately leads to child labour and overworking of employees.

        Countries where leisure time is important such as those in the EU have seen more consistent decline as they follow the phrase "working to live" instead of "living to work". This phrase is common when comparing the United States with European living standards as Europeans tend to follow a stereotype of enjoying life away from working much more than a typical American. Mexico along with India and South Africa also follow the same standard as the United States as they also are on the higher end of annual working hours and on the daily working hours. Unfortunately, this isn't by choice but much more by force. Average poverty levels also are a factor into working hours. Mexico, India and South Africa share working hours of 2250, 2125, and 2200 respectively in 2019 and share a very minimal decrease in the last 70 years. In 2019 the share of population living under the upper middle income poverty line ($6.85 per day) is 32.55%, 61.62% and 88.9% respectively.

        How does one get out of poverty? The main way for one to overcome poverty is to work harder and to work more which explains why Mexicans, Indians and South Africans work so much. These numbers are extremely large when compared to the others. Countries such as Germany have a share of only 0.25% which is

the lowest out of the countries listed. With the inverse relationship described it is clear as to why Germans tend to work so much less, at around 1375 hours per year. Countries such as USA, UK, Spain, Japan, and France all share a similar proportion of poverty, that being of around 2%. This data is consistent with the number of working hours being similar to each other's at around 1625 hours per year. The definition of a developed country according to the Cambridge dictionary is that with a lot of industrial activity and where people generally have high incomes. The more developed the country is the higher the wages tend to be making it easier for inhabitants to pay for their daily needs. This leads to economic prosperity, less time working, and more leisure time.
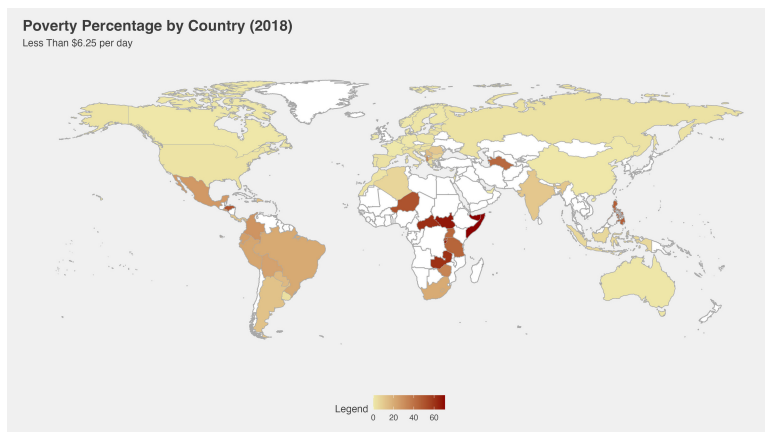
**Note that not all countries have results for the specified year. Countries with no data have been left blank.

Our time with others
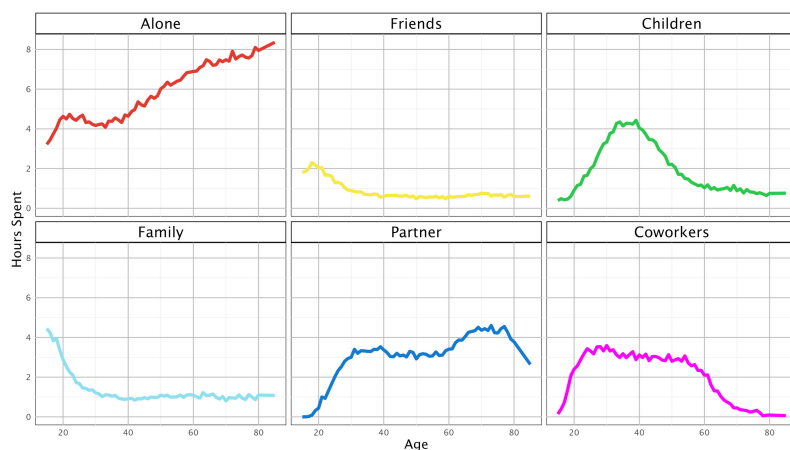
Time With Coworkers

The graph represents the amount of time an individual spends with coworkers during life, measured in hours per day. The x-axis represents different age groups, while the y-axis represents the number of hours spent with coworkers.

From the start of adulthood at 18 years old until the mid-20s, the graph shows an increasing trend. During this period, the time spent with coworkers gradually rises from 0 hours to 3.5 hours per day. This suggests that individuals in this age group are entering the workforce and establishing professional relationships, which require regular interaction with coworkers.

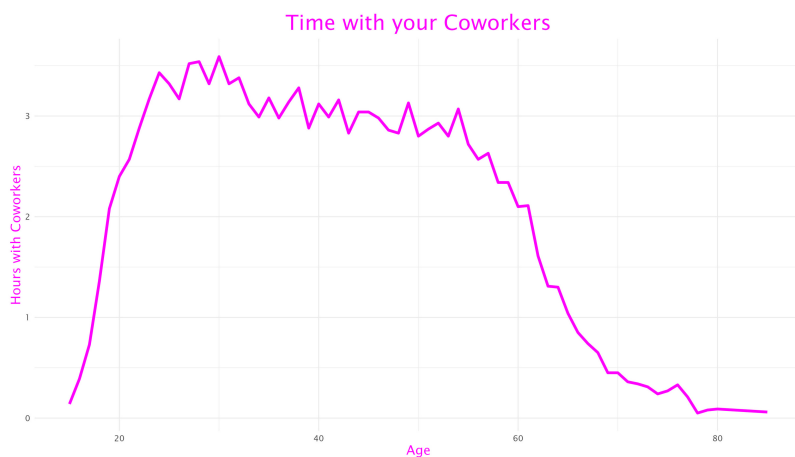After reaching the mid-20s, the graph depicts a flat line, indicating a constant level of hours spent with coworkers. This suggests that once individuals have settled into their careers or established stable work routines, the amount of time spent interacting with coworkers remains relatively steady. This might be due to factors such as consistent work hours, routine work schedules, …

However, as individuals reach their 60s, the graph starts to show a decreasing trend. This signifies that, in later stages of their careers or nearing retirement, individuals may spend less time with coworkers. This decline could be attributed to factors like reduced working hours, transitioning to part-time employment, or a shift in priorities towards personal or family commitments.

Average Retirement Age

Average Retirement Age in Every State

Mean: 63.86 and Median: 64
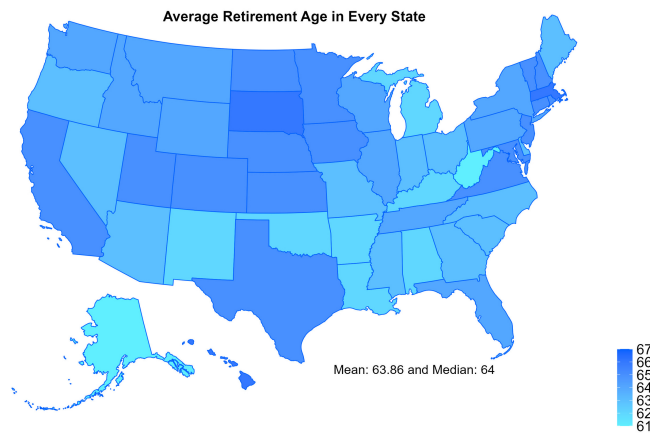
Upon analyzing the graph, it is evident that there is variation in the average retirement age across different states in the United States. The graph illustrates the average retirement age in each state, ranging from 61 to 67 years.

The state with the highest average retirement age is the District of Columbia, where individuals typically retire at the age of 67. Following closely are Hawaii, Massachusetts, and South Dakota, with an average retirement age of 66. These states exhibit a trend of delayed retirement, possibly due to factors such as higher cost of living, access to better healthcare facilities, or the presence of government or professional jobs that offer attractive retirement benefits.

The states with the lowest average retirement age, ranging from 61 to 63, include Maine, Nevada, Delaware, Arizona, North Carolina, South Carolina, Ohio, Indiana, Missouri, Georgia, Mississippi, Louisiana, New Mexico, Michigan, Kentucky, Alabama, Oklahoma, Arkansas, and Alaska. These states seemingly experience earlier retirements, which can be attributed to various factors such as lower life expectancy, prevalence of physically demanding jobs, or differences in social security benefits.

Examining our data, we can deduce that the average retirement age for all the states combined is approximately 63.86 years, while the median retirement age is 64 years. The mean represents the average age across all states. On the other hand, the median signifies the middle point, with 50% of the states having a retirement age of 64 or lower, and the other 50% having a retirement age of 64 or higher.

💡Now, connecting this graph with the pattern of spending less time with coworkers and more time with partners as individuals age, it can be inferred that retirement age influences interpersonal relationships. As people retire, they tend to shift their focus from their professional networks to nurturing and investing in their personal relationships, particularly with their partners. The mean retirement age of 63.86 years and the median retirement age of 64 years highlight the significance of age in the retirement decision. As individuals approach this age range, they may experience changing priorities. This shift may result in a decrease in time spent with coworkers and an increase in quality time spent with their partners.

Time With Family

Time with your Family
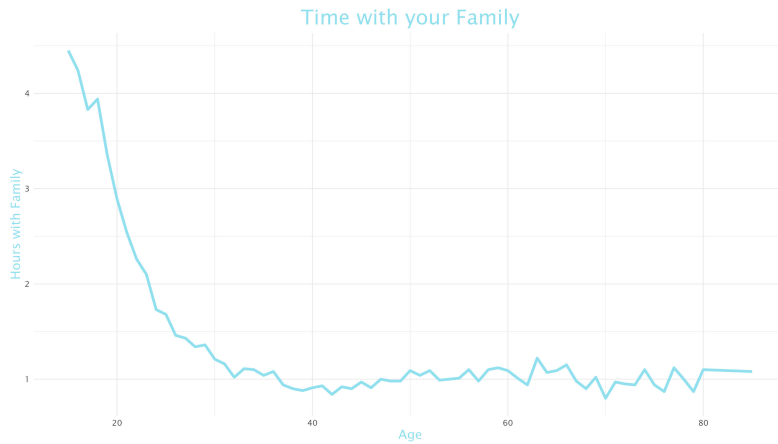
Time with our family decreases as our lives go on for several reasons. For instance, when we are young, we require a lot of attention and care from our parents and older siblings, which is why the graph peaks at the beginning. Keeping in mind that the graph starts at the age of 15, we note that we still spend a lot of time with our family. If we move away to college or not, our time with our parents and family dwindles drastically because our days are filled with schoolwork, internships, and schooling as well. This number does not get any better as we age as family members begin to die, now having a job takes up a large part of our time.

Time With Children

Time with your Children
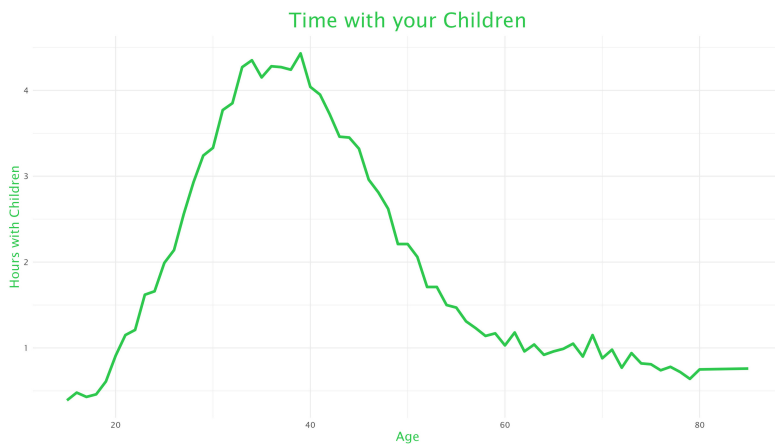
The graph depicts the amount of time parents spend with their children on a daily basis throughout their lifespan. From the ages of 20 to 40, the graph shows an increasing trend in the time spent with children, reaching a peak of 4.5 hours a day. This could be indicative of parents being actively involved in the upbringing of their children during their early adulthood.

However, as the graph progresses beyond the age of 40, the time spent with children decreases gradually. By the time parents reach the age of 60, the graph shows that they are spending only one hour a day with their children.

💡Extra information*: in the US, young adults typically leave their parents' home before the age of 27. In light of this information, we can infer that parents tend to have their children in their early 20s to mid-20s, as indicated by the increasing trend in the graph during that age range. If a child leaves home at the age of 18, for example, parents would be around 43 years old at that time.

Considering that parents spend less time with their children as they reach their 60s, it aligns with the understanding that children are more likely to have moved out of the parental household by their late 20s. The decreasing trend in the graph from 40 to 60 can be explained by the fact that parents have fewer responsibilities related to child-rearing as their children become more independent and move out.

Furthermore, the additional information provided about US women delaying the age of having children by 25 reinforces the idea that parents on the graph are likely to have their children in their 20s. This delay in starting a

family could also contribute to parents spending less time with their children by 60, as they may be older and more focused on their own lives and retirement planning.

Child Care

Child Care Time per day (with children age 18 or under)
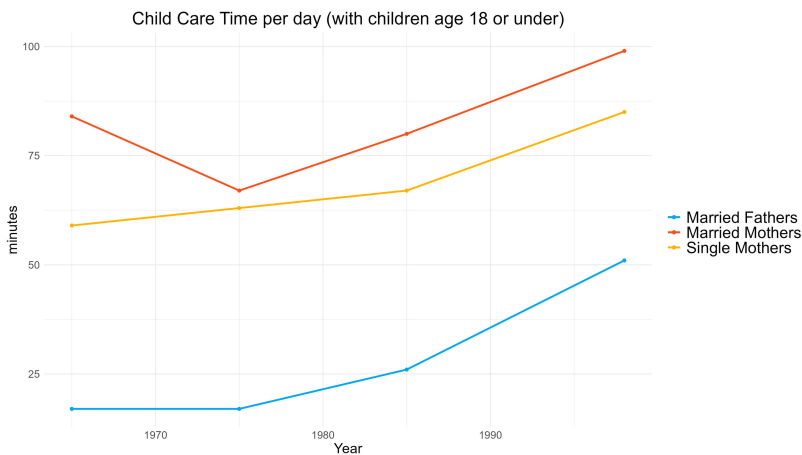
The graph of childcare time per day shows the amount of time that married fathers, married mothers, and single mothers spend with their children over the years 1965, 1975, 1985, and 1998. The x-axis represents the years, while the y-axis represents the time in minutes.

It is important to note that the graph represents population-adjusted trends. This means that the estimates are not the direct survey averages, but rather the output of a statistical model that takes into account factors such as age, partnership status, number of children, and employment. These adjustments are made to account for differences between population groups within countries and changes in the relative size of these groups over time. If we were to plot the raw survey estimates without accounting for population changes, the trends would still show an increase in childcare time for both fathers and mothers.

From this information, we can infer that parents are spending more time with their children over the years. This trend is likely to continue in the future, as parents are expected to spend even more hours per day with their children. This conclusion can be drawn from the interpretation of the other graph (Time with Chidren) that shows how much time parents spend with their kids over their life stages. As the time with children increases, we can expect the curve of the graph to be higher on the y-axis, indicating increased time spent with children.

Time With Friends
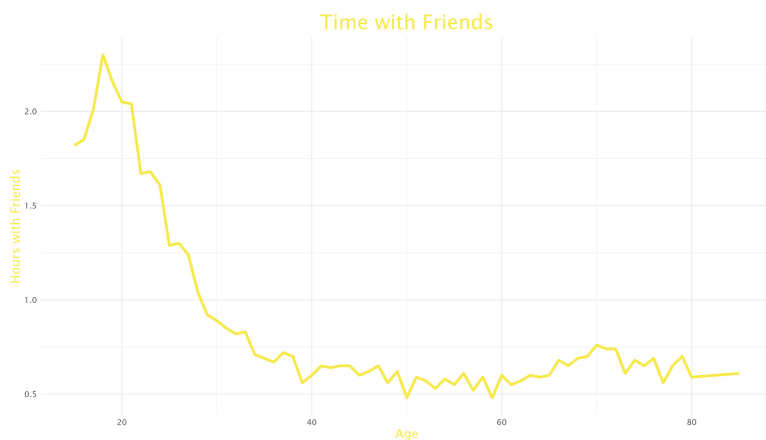
Time with Friends

Time spent with friends has the greatest decline and then plateaus out of all the graphs. Why? When we are young, we are taught to always have a lot of friends and be friendly because they are the ones who will help us get through life. This is completely the case when we are in college as we live with our friends and everything we do seems to be done with friends. The amount of free time we have could not be less existent yet we are still finding a way to be available for them. Unfortunately, as time goes on this number and the time, we have for them begins to decrease, we start to travel, looking for jobs causes us to move to different cities, states or even countries. The only ones that hold on are the closest ones and this number starts to fall. After turning twenty years old we see this sudden decrease and it only becomes worse and worse until we hit 30. Why might you ask? As time goes on hang outs become phone calls and before you know it the time which you used to have

for friends becomes time spent with coworkers. Discussing job opportunities and strategies along with asking how the family is doing now becomes the new norm. Time spent with friends has now reached its lowest point and stays like that, slightly fluctuating from year to year but staying between 0.5 and 1 hour per day. A sudden increase after being so low pushes to around one hour per day after one retires (around 62 to 67 years of age) and then stays constant throughout. Spending time with the ones who we have left or not getting any visits at all. Unfortunately, that extra time left is spent feeling alone.

Time With Partner

Time with your Partner
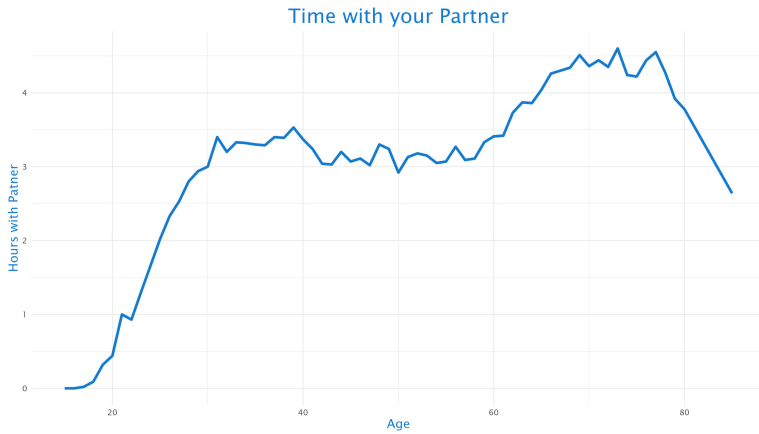
Time spent with one's partner has a constant increase as in our earlier years having a partner is rare. As we age having a partner becomes more common and hits a peak around 3 to 4 hours a day at the age of 30 to 60 years old. This peak is hit because most couples tend to be working and at least one of the partners if not both have full time jobs. This leaves a maximum amount of free time which in a loving relationship tends to be just a few hours at the end of the day allocated for family members and other activities. Considering the previous information on retirement age, there is an increase in time spent with your partner starting at the age of retirement which, as stated earlier, tends to be around 62 to 67 years of age. This is why there is an increase beginning at the age of 60 and multiplies all the way until 70 years of age where it then peaks off again. We then see a dip of time with partners around 77 years of age which correlates exactly with the life expectancy of a human in the United States. This decline is drastic due to the time spent with one's partner being 0 once that partner dies creating an influx in data points. This decline in time spent with partners is one of the main causes for change in mental health. Having felt like one has lost a vital piece of themselves can cause a tremendous decline in overall happiness and make one feel vulnerable and alone.

Time Alone
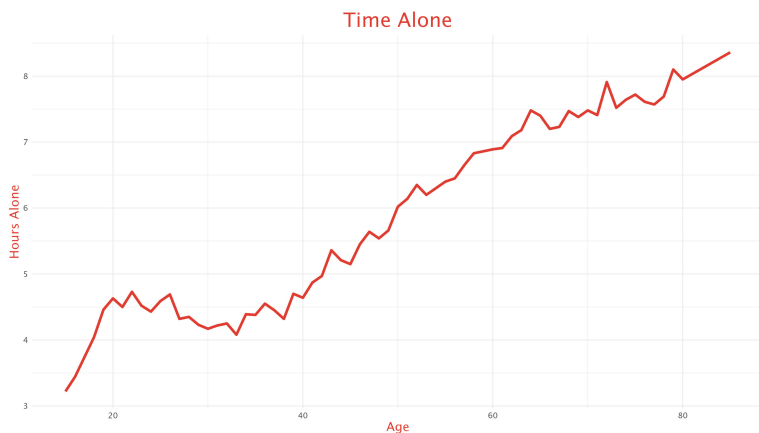
Time Alone

As individuals age, it is not uncommon for them to spend a significant amount of time alone. This is understandable due to various factors, including the deterioration of health and the loss of relatives and friends. Health issues often arise with age, leading to a decrease in mobility and an increased need for solitude. Additionally, older individuals may experience the passing of loved ones, further contributing to their isolation. This trend is evident in the statistics, which reveal that a substantial number of people aged 60 and above live alone. In fact, nearly four out of every ten Americans over the age of 89 reside in solitary households.

Interestingly, the prevalence of living alone is not limited to older adults. Across all age groups, there has been a steady increase in the number of individuals living alone. This is not an isolated phenomenon but rather a global trend observed in various countries.

Tying it all together

Time Spent during life
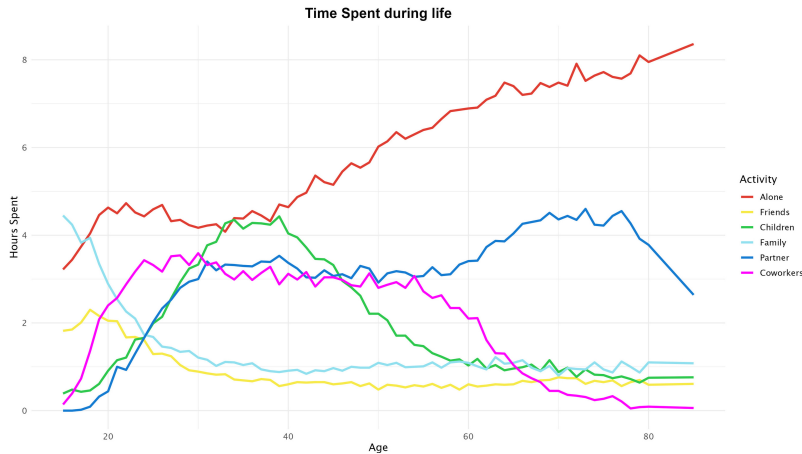
As shown above the variation in time spent has a complicated correlation. Time spent with ones partner and alone follow the same trend throughout life except for the last years where there is an inverse relationship. Time spend with friends and family also follow each other. The decrease and continual fluctuation as time goes on seems to be somewhat similar, hanging around the 1 hour line. Lastly, time spent with coworkers and children follow the same idea yet time spent with children has a much more step incline and decline later on. No matter who we spend our time with we are sacrificing time with others. There are only 24 hours in a day and that limit makes for not everything to be possible.

CONCLUSIONS

Each minute of each hour of the day, we do something different, yet every activity falls under a distinct category in life. Whether that is sleeping, working, or watching a game with one's friends, it is all calculated to make each day feel complete. Different countries like to spend their days differently, whether that is sleeping for 9 hours a day in South Africa, or working for 5 hours a day in Mexico, we all follow intercultural trends. Trends that are much deeper than one's individual wants yet more so about their needs. Taking time to do what is socially acceptable in each country and normally is what we follow. This data changes from country to country and for most countries, the trend is similar yet when it comes to paid work and other leisure activities, this is where we see the most variation. These events have to do with the costs of leisure, how much leisure can be bought by working that extra hour and let us face it, it also has to do with how developed a country is. These are just some of the many examples and connections that have been made. Taking time to understand these connections and realize that these connections exist is fundamental in comprehending cultures and habits. These are concepts that have been around for hundreds of years and cannot be broken. One step at a time with globalization we are becoming more similar, yet we still have plenty of progress to make.

How we spend our time is both voluntary and involuntary at the same time. There are choices that we make as individuals due to past experiences, our culture, and interpersonal relationships. Making these decisions and living with the consequences creates an overall happiness aspect that is hard to measure. In contrasting times of our lives, we choose to spend our time differently and live both the benefits and consequences of each decision. For some it is working that 9 to 5 job that makes us happy and getting that beer with a fellow coworker when we finish our day. For others it is working tirelessly, 12-hour days not knowing that we could be living differently. How we spend our time has always been relative and has never been a simple topic. Fear of missing another opportunity always lingers in one's head and missing those actual experiences creates doubt and uncertainty for future decisions. Friends come and go, and well jobs do as well but the one thing that remains constant throughout all of life's hardships is family. Being alone is one of the worst feelings especially when it is from the people closest. Those who are most in need are those who are older. Giving them that attention and care is what makes them feel valuable and will unbelievably improve their health. Making sure that we hold tight to those who are closest to us and allowing them to help when one needs it, because without them, well, we would not be here. We only have 24 hours per day, 365 days per year

and well due to life expectancy only 77 years per lifetime. Make wise choices and cherish the people and moments that you can.

Final Notes:

- ☐ *The extra information we provide in some cases when we explain why these changes in the graphs occur will be explained in the presentation and show with the different journalistic news and data we have relied on to find the reasons for the main changes in the trends of our charts.*
- ☐ *Due to averages and rounding, some graphs may show sums greater than 24 hours. These errors may have also caused slight fluctuations in data causing increases and decreases where applicable. (Time use by country Plot).*
- ☐ All graphs and maps were created using R studio
- ☐ https://stackoverflow.com - Code related errors
- ☐ https://app.datacamp.com/learn/career-tracks/data-scientist-with-r - Learning R studio
- ☐ https://www.youtube.com/@dataslice - ggplot animations and aesthetics

CODE in **R**studio

Code Corresponding to Graph titled "Time Use by Country (aged 15 to 64)

```
43  custom_colors <- c("maroon1", "mediumorchid1", "plum", "rosybrown2", "seashell4","paleturquoise3",
44                     "mediumaquamarine","#85b22d", "olivedrab1", "#FFFF00", "#FFCC00", "peru", "salmon", "tomato2")
45  ggplot(Time_Use, aes(x = Country, y = Hours, fill = Activity,label=Hours)) +
46    scale_fill_manual(values = custom_colors) +
47    theme_minimal() +
48    geom_bar(stat = "identity") +
49    geom_text(size=3, position=position_stack(vjust=0.5))+
50    labs(
51      x = "Country",
52      y = "Time (Hours)",
53      title = "Time Use by Country (aged 15 to 64)",
54      subtitle ="Source:https://ourworldindata.org/time-use",
55      size=14,
56      face="bold"
57    ) +
58    theme(axis.text.x = element_text(angle = 45, hjust = 1),
59          plot.title = element_text(size=20, face = "bold", hjust=0.5),
60          axis.text.y = element_text(size=10))+
61    coord_flip()
62
63  ggsave("World_Data.jpg", width=3840, height= 2160, units=c("px"))
```

Code Corresponding to table depicting the Mean, Maximum, Minimum, Median, Standard Deviation and Variance

```
76  Activity_mean_median <- Time_Use %>%
77    select(-Country,-Minutes) %>%
78    group_by(Activity) %>%
79    summarise(Mean=mean(Hours), Max=max(Hours), Min=min(Hours), Median=median(Hours), Std=sd(Hours), Var= var(Hours))
80  Activity_mean_median <- Activity_mean_median %>%
81    mutate(round(Activity_mean_median[,c(2:7)],2))
82  Activity_mean_median <- Activity_mean_median[order(Activity_mean_median$Mean,decreasing=TRUE),]
83  View(Activity_mean_median)
```

Code Corresponding to "Distribution of Time Spent per Day by Activity"

```
24  custom_colors <- c("maroon1", "mediumorchid1", "plum", "rosybrown2", "seashell4","paleturquoise3",
25                     "mediumaquamarine","#85b22d", "olivedrab1", "#FFFF00", "#FFCC00", "peru", "salmon", "tomato2")
26  ggplot(Time_Use, aes(x=Activity, y=Hours, fill=Activity))+
27    geom_flat_violin(aes(fill=Activity),position=position_nudge(x=0,y=0),
28                     adjust=2, trim=FALSE, colour=NA) +
29    labs(x= "Activity", y="Hours", title= "Distribution of Time Spent per Day by Activity",
30         subtitle= "Source: https://ourworldindata.org/time-use",
31         size=14)+
32    coord_flip() +
33    theme_minimal()+
34    scale_fill_manual(values=custom_colors)+
35    theme(plot.title = element_text(size=20, face = "bold", hjust=0.5),
36          axis.text.y = element_text(size=10))+
37    stat_summary(geom = "point", fun = mean, shape = 19, size = 1,
38                 aes(group = Activity))
39  ggsave("Flat_Violin.jpg", width=3840, height= 2160, units=c("px"))
```

Code Corresponding to graph titled "Average Annual Working Hours per Year by Country"

```r
28  custom_colors <- c("royalblue2", "black", "pink","green3", "orange2", "brown", "gold1", "navy", "red")
29  ggplot(annual_working_hours, aes(x= Year, y= Hours, color= Country))+
30    scale_color_manual(values = custom_colors) +
31    theme_minimal() +
32    geom_line(size=1)+
33    geom_point(size=2)+
34    labs(
35      x = "Year",
36      y = "Time (Hours)",
37      title = "Average Annual Working Hours per Year by Country",
38      subtitle ="Source:https://ourworldindata.org/time-use"
39    ) +
40    theme(plot.title = element_text(size=20, face = "bold", hjust=0.5))+
41    xlim(1950,2020)+
42    ylim(1250,2500)
43
44    ggsave("Working_Hours.jpg", width=3840, height= 2160, units=c("px"))
```

Code Corresponding to Map titled "Poverty Percentage by Country (2018)"

```r
40  world <- map_data('world') %>%
41    filter(region != "Antarctica") %>% fortify
42  ggplot() +
43    geom_map(data = world, map = world, aes(long, lat, map_id = region), fill = "white",color = "darkgrey", linewidth = 0.5) +
44    geom_map(data = poverty_gap, map = world,
45             aes(fill = value, map_id = region),color = "darkgrey", linewidth = 0.2) +
46    coord_map("rectangular", lat0 = 0, xlim = c(-180, 180), ylim = c(-70, 90)) +
47    scale_fill_continuous(low = "palegoldenrod", high = "red", guide = "colorbar")+
48    scale_y_continuous(breaks=c()) +
49    scale_x_continuous(breaks=c()) +
50    labs(fill="Legend", title="Poverty Percentage by Country (2018)", subtitle="Less Than $6.25 per day") +
51    theme(plot.title = element_text(size=20, face = "bold", hjust=0.5))+
52    theme_fivethirtyeight()
53
54  ggsave("Poverty_Percentage.jpg", width=3840, height= 2160, units=c("px"))
```

Code Corresponding to graph titled "Child Care Time per Day (With children age 18 or under)"

```r
library(ggplot2)

#Data frame
data <- data.frame(
  Year = c(1965, 1975, 1985, 1998),
  Married_Fathers = c(17, 17, 26, 51),
  Married_Mothers = c(84, 67, 80, 99),
  Single_Mothers = c(59, 63, 67, 85)
)

# Line ggplot
ggplot(data, aes(x = Year)) +
  geom_line(aes(y = Married_Fathers, color = "Married Fathers"), size = 1) +
  geom_line(aes(y = Married_Mothers, color = "Married Mothers"), size = 1) +
  geom_line(aes(y = Single_Mothers, color = "Single Mothers"), size = 1) +
  geom_point(aes(y = Married_Fathers, color = "Married Fathers"), size=1.5)+
  geom_point(aes(y = Married_Mothers, color = "Married Mothers"), size = 1.5)+
  geom_point(aes(y = Single_Mothers, color = "Single Mothers"), size =1.5)+
  labs(title = "Child Care Time per day (with children age 18 or under)",
       x = "Year",
       y = "minutes") +
  scale_color_manual(
    values = c("Married Fathers" = "#00a6ed", "Married Mothers" = "#ff651d", "Single Mothers" = "#ffb400")) +
  theme_minimal() +
  theme(legend.title = element_blank(),
        plot.title = element_text(size = 20, hjust = 0.5),
        legend.text = element_text(size = 18),
        axis.title = element_text(size = 16),
        axis.text = element_text(size = 12))

ggsave("UsChildCare_plot.jpg",width = 3840, height = 2160, units = c("px"))
```

Code Corresponding to graph titled "Average Retirerment in Every State"

```r
library(usmap)
library(ggplot2)
library(extrafont)

# Create a data frame with state names and average retirement age
retirement_data <- data.frame(
  state = c("District of Columbia", "Hawaii", "Massachusetts", "South Dakota", "Maryland", "Connecticut", "New Jersey", "Vermont", "Rhode Island", "New Hampshire",
            "Colorado", "Virginia", "North Dakota", "Minnesota", "Utah", "Nebraska", "Iowa", "Texas", "Kansas", "California",
            "New York", "Washington", "Pennsylvania", "Wisconsin", "Florida", "Montana", "Illinois", "Idaho", "Wyoming", "Tennessee",
            "Oregon", "Maine", "Nevada", "Delaware", "Arizona", "North Carolina", "South Carolina", "Ohio", "Indiana", "Missouri", "Georgia", "Mississippi",
            "Louisiana", "New Mexico", "Michigan", "Kentucky", "Alabama", "Oklahoma", "Arkansas", "Alaska", "West Virginia"),
  values = c(67, 66, 66, 66, 65, 65, 65, 65, 65, 65, 65, 65, 65, 65, 65, 65, 65, 65, 65, 64, 64, 64, 64, 64, 64, 64, 64, 64, 63,
             63, 63, 63, 63, 63, 63, 63, 63, 63, 62, 62, 62, 62, 62, 62, 62, 61, 61)
)

# Your existing code for creating the plot
Retirement_plot <- plot_usmap(data = retirement_data, color = "#0061ff") +
  scale_fill_continuous(
    low = "#0eff", high = "#0061ff", name = "", label = scales::comma
  ) + theme(legend.position = "right",
            legend.text = element_text(size = 16)) +
  labs(title = "Average Retirement Age in Every State")

# Change the title font
Retirement_plot + theme(
  plot.title = element_text(family = "Lucida Sans Unicode", size = 16, face = "bold", hjust = 0.5, vjust = - 10)
) +
  annotate(geom = "text", x = 0.5, y = -0.5, label = "Mean: 63.86 and Median: 64", size = 5, hjust = -0.4, vjust = 30)

ggsave("Retirement_plot.jpg",width = 3840, height = 2160, units = c("px"))

# Mean and median of the plot:
Median <- median(retirement_data$values)
Median
Mean <- mean(retirement_data$values)
Mean
```

Code Corresponding to graph titled "Our Time with Others" and each graph by activity

```r
# Importing time_spent and cleaning the data (transforming to hours)
time_spent
time_spent_edited <- time_spent[,-c(1,2)]
colnames(time_spent_edited) <- c("Age","Alone","Friends","Children","Family","Partner","Coworkers")
time_spent_edited <- time_spent_edited %>%
  mutate(time_spent_edited[,c(2:7)]/60)
time_spent_edited <- time_spent_edited %>%
  mutate(round(time_spent_edited[,c(2:7)],2))
rownames(time_spent_edited) <- time_spent_edited$Age
View(time_spent_edited)

# Melting data to form the necessary column names and numbers
time_spent_long <- melt(time_spent_edited, id.vars = "Age", variable.name = "Activity", value.name = "Hours")

# Define custom colors for each activity (total of 6 colors)
custom_colors <- c("#e03c31", "#f7ea48","#2dc84d", "#90e0ef", "#147bd1", "#FF00FF")

# Create a faceted plot with custom line colors and modified titles
facet_plot <- ggplot(time_spent_long, aes(x = Age, y = Hours, color = Activity)) +
  geom_line(size = 1.75) +
  labs(x = "Age", y = "Hours Spent") +
  scale_x_continuous(limits = c(15, max(time_spent_long$Age))) +
  facet_wrap(~Activity, ncol = 3) +  # Display facets in 3 columns
  scale_color_manual(values = custom_colors) +  # Assign custom colors to each facet
  theme_minimal() +
  theme(
    text = element_text(family = "Lucida Sans Unicode", size = 12),
    axis.title = element_text(size = 15),
    panel.background = element_rect(fill = "white"),
    panel.grid.major = element_line(color = "gray"),
    strip.text = element_text(size = 17, color = "black"),
    strip.background = element_rect(size=0.8, linetype='solid'),
    legend.position = "none"  # Remove the legend
  )
ggsave("Facet_plot.jpg",width = 3840, height = 2160, units = c("px"))
# Print the faceted plot
print(facet_plot)

#Creating a line graph with each representation of time spend based on age
ggplot(time_spent_long, aes(x = Age, y = Hours, color = Activity)) +
  geom_line(size = 1.2) +
  scale_color_manual(values = custom_colors) +
  labs(x = "Age", y = "Hours Spent") +
  scale_x_continuous(limits = c(15, max(time_spent_edited$Age))) +
  theme_minimal() +
  theme(
    text = element_text(family = "Lucida Sans Unicode", size = 12),
    axis.title = element_text(size = 12),
    plot.background = element_rect(fill = "white"),
    plot.title = element_text(size = 16, face = "bold", hjust = 0.5)  # Center the title horizontally
  ) +
  ggtitle("Time Spent during life")
ggsave("Time_spent.jpg",width = 3840, height = 2160, units = c("px"))
```